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Observation of majorana quasiparticles' edge states in superfluid3he

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Abstract

© Springer-Verlag Wien 2014. We suggest in this article the nuclear magnetic resonance (NMR) method of observation and investigations of Majorana fermions at the edge of Topological Insulator, superfluid 3He-B. The Majorana fermions form the remarkable quantum state of condensed matter where particle-like and antiparticle (holelike) excitations are indistinguishable. They have been observed recently by deviation of the temperature dependence of the superfluid3He-B heat capacity from the well-known exponential law for Bogoliubov quasiparticles at the world limit of ultra-low temperatures. The experimental data are well described by adding the heat capacity of Majorana quasiparticles' edge states with zero energy gap. We report here the results of the similar experiments with extended temperature range down to 125 lK. The possible way to detect these states by means of NMR is also discussed.

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